

# **BTEC Tech Award in Sport Revision Booklet**

## **Learning Outcome A: The Importance of Fitness for Sports Performance**

### **Answers**



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# Introduction

This revision work-booklet includes topic overview sheets and exam questions.

The topic overview sheets include a range of key information, images and diagrams in order to help you revise each topic. There are lots of gaps within these sheets which you will need to fill in. Lets look at an example.



As you can see, there are gaps in the description of gross and fine skills shown below.

**Types of Rewards**

<b>Tangible</b>		_____ rewards
<b>Intangible</b>		_____, often _____, rewards

You simply need to fill in the gaps in order to complete the definition.

**Types of Rewards**

<b>Tangible</b>		<u>Tangible</u> rewards
<b>Intangible</b>		<u>Non-tangible</u> , often <u>verbal</u> , rewards

The example below shows that you need to complete the bullet points covering the FITT principle

**The FITT Principle is used to identify the basic principles of training**

- ➡ How often training takes place
- ➡ How 'hard' training is
- ➡ How long training lasts
- ➡ What type of training is used



After filling in the answers, the bullet points will look like this:

**The FITT Principle is used to identify the basic principles of training**

<b>Frequency</b>	➡	How often training takes place
<b>Intensity</b>	➡	How 'hard' training is
<b>Time</b>	➡	How long training lasts
<b>Type</b>	➡	What type of training is used



You will also be required to answer a number of exam questions throughout the booklet. Read each question carefully and pay close attention to the amount of marks available.



# Components of Physical Fitness

## Flexibility

The range of movement possible at a joint



## Aerobic Endurance

Ability of heart and lungs to supply oxygen to the working muscles



## Body Composition

The percentage of body weight that is muscle, fat or bone



## Muscular Endurance

The ability of a muscle or muscle group to undergo repeated contractions avoiding fatigue

## Muscular Strength

The ability to overcome a resistance



## Speed

The rate at which an athlete can perform a movement or cover a distance

## Coordination

The ability to use two or more body parts together at the same time



## Components of Skill-Related Fitness

## Power

The ability to undertake strength performances quickly  
 $\text{Power} = \text{Strength} \times \text{Speed}$



## Agility

The ability to move and change direction quickly whilst maintaining control



## Reaction Time

The time taken to initiate a response to a stimulus



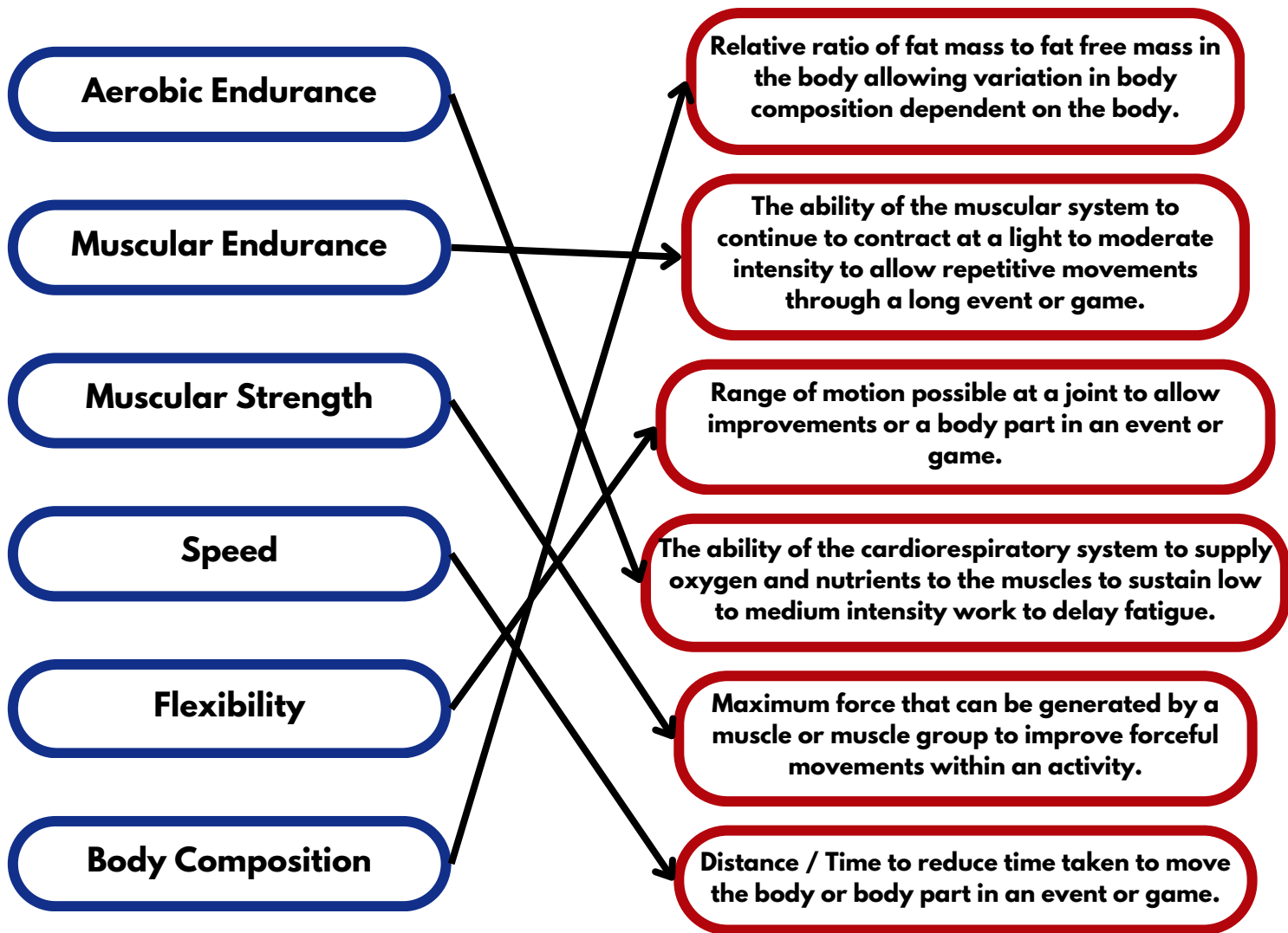
## Balance


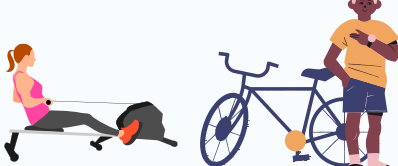
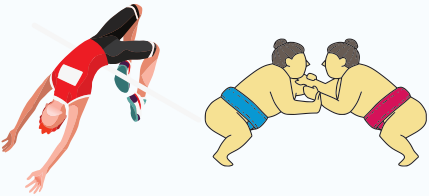

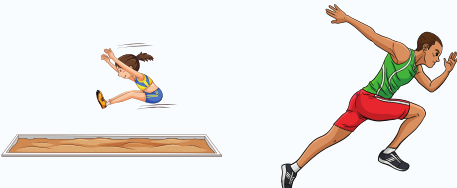
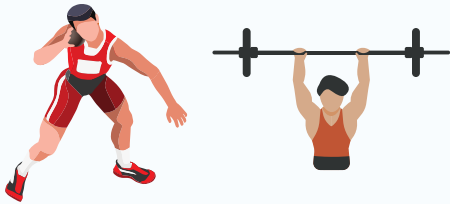
Maintenance of the centre of mass over the base of support



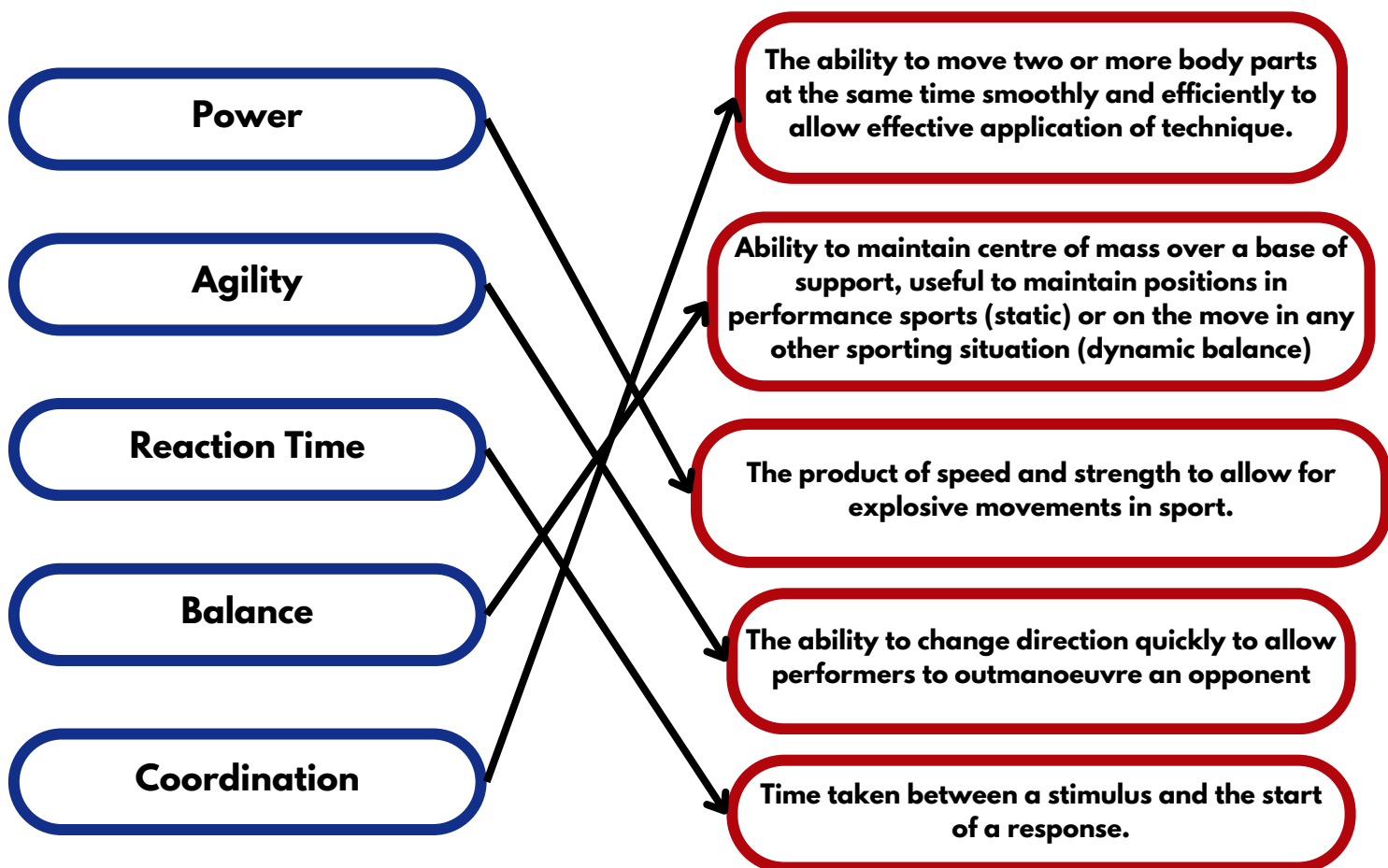




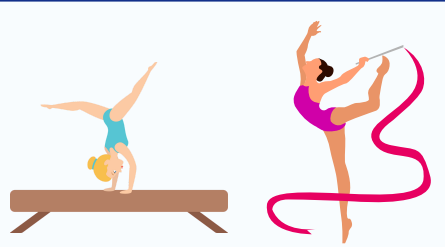
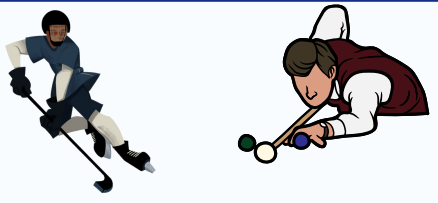

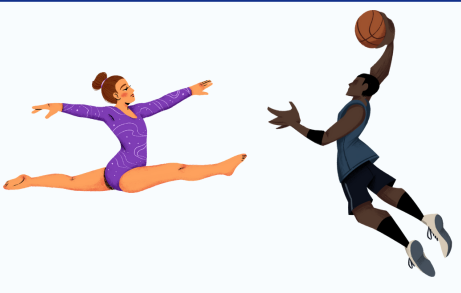
1. Match the component of physical fitness to the description
2. Identify the component of fitness from the sporting examples



 <p>is a key component of performance sports/events longer than 30 minutes</p>	 <p>is a key component of performance sports/events longer than 30 minutes</p>	 <p>is depends on the sport. Sports like gymnastic benefit from low body part and sprinters high muscle mass</p>
 <p>is a key component of activities requiring wide range of movement around a joint</p>	 <p>is a key component of activities requiring fast movements</p>	 <p>is a key component of activities requiring force.</p>

1. Match the component of skill-related fitness to the description
2. Identify the component of fitness from the sporting examples



 <p>_____ is a key component of performance in activities requiring quick changes in direction</p>	 <p>_____ is a key component of performance in activities where a quick response or decision to stimuli is needed</p>	 <p>_____ is a key component of performance sports where you need to maintain positions</p>
 <p>_____ is a key component of activities requiring independent movement of body parts or use of sporting equipment</p>	 <p>_____ is a key component of sports where you are constantly on the move</p>	 <p>_____ is a key component of activities requiring explosive movements</p>

## 1 Marker

1. Which two components of fitness are required to do well in a triathlon? (1 mark)

- a. Speed and Flexibility
- b. Balance and Coordination
- c. Muscular Endurance and Aerobic Endurance - **Correct answer**
- d. Muscular Strength and Power



2. Which two components of fitness are required to do well in the 100m sprint? (1 mark)

- a. Power and Speed - **Correct answer**
- b. Power and Muscular Endurance
- c. Speed and Flexibility
- d. Balance and Reaction Time



3. Define coordination (1 mark)

**Mark One** – The ability to move two or more body parts at the same time to smoothly and efficiently apply technique

## 2 Markers

4. Explain the different between muscular strength and muscular endurance (2 marks)



**Mark One** – Muscular strength is the ability of a muscle or muscle group to exert maximal force against a resistance in a single repetition

**Mark Two** – Muscular endurance is the ability of a muscle or muscle group to sustain repeated contractions over an extended number of repetitions

**Accept Other Appropriate Answers**



5. Name two sports or activities that require high levels of hand-eye coordination. (2 marks)

**One mark for each of the following up to a maximum of two marks:**

- Cricket
- Tennis
- Badminton
- Table Tennis
- Archery

**Accept other acceptable answers**

### 3 Markers

6. Explain the significant of reaction time in sports. Provide an example of a sport or activity where having a quick reaction time is essential for success. (3 marks)



**Mark One** - Reaction time is the time it taken to respond to a stimulus

**Mark Two** - This is significant because it allows sportspeople to make quick decisions to respond to changing situations

**Mark Three** - For example, reaction time is important in the sport of table tennis because it allows players to perform more precise movements in response to fast serves or unexpected chances in the ball's trajectory.

7. Describe the relationship between agility and balance in sports performance. Give two examples of sports where both agility and balance are important and complement each other. (3 marks)

**Mark One** - Agility allows sportspeople to quickly change direction to a changing situation but this requires balance to ensure this rapid movements are stable.

**Mark Two** - For example, in the sport of gymnastics, agility is needed for dynamic flips whilst balance is important to landing this movements securely.

**Mark Three** - Another example is football, where the player needs agility for quick direction changes but requires balance to dribbling the football or making sudden stops to avoid losing possession.

**Must provide the role of both agility and balance to gain the marks.**





## 6 Marker

**8. Assess the importance of high levels of aerobic endurance and agility when participating in a game of tennis. (6 marks)**



**Aerobic Endurance** – Assessment of the role of aerobic endurance in tennis. e.g.

- Aerobic endurance is important in tennis because the game involves continuous movements such as running and lateral shuffles, which means participants need to be able to use their aerobic system for exercise for longer than 30 minutes.
- Players with high aerobic endurance can maintain their energy levels throughout the match, which reduces the likelihood of fatigue over multiple sets, which will decrease their performance levels.

**Agility** – Assessment of the role of agility in tennis. e.g.

- Agility is important in tennis because players need to be able to change direction rapidly in response to the opponents actions.
- Players with higher levels of ability will be able to reach the ball faster and more efficiently. This will give them more time to execute their shot more precisely and increases the chance they can outmaneuver their opponent.

**A03** – Analysis and evaluation of how aerobic endurance and agility combine in tennis. e.g.

- Combined, aerobic endurance and agility equip a player with the ability to meet the physical demands of a game of tennis.
- This is because agility quick and efficient movements making it easier to respond to and perform good shots and aerobic endurance ensures sustained energy levels throughout in order to maintain this level of agility.

**Accept other appropriate answers**





The **FITT** Principle is used to identify the basic principles of training

- |                  |   |                                |
|------------------|---|--------------------------------|
| <b>Frequency</b> | → | How often training takes place |
| <b>Intensity</b> | → | How 'hard' training is         |
| <b>Time</b>      | → | How long training lasts        |
| <b>Type</b>      | → | What type of training is used  |



### Additional Principles of Training

- |                             |                      |
|-----------------------------|----------------------|
| → 1. Progressive Overload   | → 4. Adaptation      |
| → 2. Specificity            | → 5. Reversibility   |
| → 3. Individual Differences | → 6. Variation       |
|                             | → 7. Rest & Recovery |

#### Reversibility

- This means gradually losing fitness and occurs to anybody who stops training

#### Reasons for Reversibility:

- Injury
- Demotivation
- Off-Season
- Illness
- Fatigue

#### Progressive Overload

- This means gradually increasing the amount of overload during training in order to improve fitness but without injury
- If you increase the intensity of your workouts gradually you will make steady improvements

## A2 PRINCIPLES OF TRAINING



#### Adaptation

- This is about how your body changes due to increased training loads.



#### Specificity

- This means matching training to the requirements of an activity
- Different sports and different positions require athletes to use different training methods in order to reach their potential



#### Individual Differences

- The needs of an individual could alter due to their fitness level, weight, gender or previous injuries

#### Variation

- You can avoid boredom and maintain motivation to train by altering the types of training.

#### Rest & Recovery

- This is very important during an exercise programme and without adequate rest, injury or burnout become likely



**Complete the table by recommending how many training sessions a beginner should do a week to build their fitness**

Week	1	2	3	4	5	6	7	8
No. of Training Sessions	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>4</u>	<u>5</u>

**How many training sessions per week would you recommend to someone looking to target the following components of fitness?**

**Muscular Strength - 2-3 sessions**  
**Aerobic Endurance - 3+ sessions**  
**Speed - 2-3 sessions**  
**Power - 2-3 sessions**  
**Flexibility - Every warm up and cool down**  
**Muscular Endurance - 2-3 sessions**

Weekly	
-	
-	
-	
-	
-	
-	

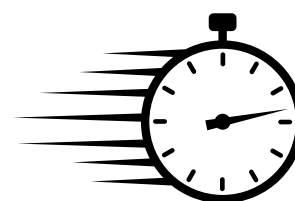
**How long should the following training sessions for the described goals last?**

**HIIT training for developing cardiovascular fitness (aerobic and anaerobic)**

- Short work periods (30-60 seconds) which up to 30 seconds rest in between.
- Whole session no more than 30 minutes

**Continuous/Fartlek Training for developing cardiovascular fitness (aerobic)**

- At least 30 minutes



**Weight training to lose fat and increase overall fitness**

- At least 30 minutes



## Identify the principle of training from the example

Principle	Example
<u>Specificity</u>	A cross country runner could take part in trial running to develop aerobic endurance. They could also train at home or the gym on a treadmill.
<u>Overtraining</u>	A sprinter who trains anaerobically too many times a week will be at a greater risk of injuries such as shin splints as the body isn't recovered.
<u>Reversibility</u>	If a weight lifter is injured and doesn't train for a few months, the body muscle size will decrease towards its pre-exercise state.
<u>Progressive Overload</u>	A beginner who has signed up to a long distance cycling event in 3 months' time can gradually increase the time they spend training by increasing the length and distance of training sessions.
<u>Variation</u>	A swimmer can do one to two sessions of land training, such as weights, per week to reduce the chance of becoming bored by just training in the pool.
<u>Individual Differences</u>	A young person may need more games-based training compared to older people in order to enjoy it, feel motivated and develop skills' by learning from teammates and coaches.
<u>Adaptation</u>	A beginner starting to strength train have muscular changes including an increase in muscle size
<u>Rest &amp; Recovery</u>	If an individual has undergo an intense spin session, they need to consume more carbohydrates in order to replenish glycogen stores to have the energy available to perform at a high intensity again.





# 1 Markers

1. Muha is a taekwondo performer who is looking to improve their flexibility. How often should Muha take part in flexibility training? (1 mark)

**Mark One** - At the start and end of every training session



2. Leslie is about to start training for a half marathon race. How many days a week should Leslie train to improve their aerobic endurance? (1 mark)

**Mark One** - 3 days a week



3. Define reversibility. (1 mark)

**Mark One** - The loss of fitness gains when training is stopped/intensity of training is lowered.

# 2 Markers

4. Kane is a cyclist. Describe two ways in which Kane could use the principle of specificity to improve his cyclist performance. (2 marks)

**Mark One** – Kane could go train on his bike to improve his fitness for cycle

**Mark Two** – Kane could go to a spinning class at a local gym to improve his fitness for cycling movements.

5. Explain the importance of having at least one rest day per week. (2 marks)

**Mark One** – The body needs to have time to adapt to the training that the individual has completed, which requires rest between sessions.

**Mark Two** – Otherwise, the individual may not see improvement in fitness levels.

6. Fiona is training for a marathon. For the last two months she has ran the same route around her local park. Suggest two ways in which Fiona could apply the variation principle into her training to avoid boredom. (2 marks)

**Mark One** - Fiona could run at a different location at least once per week.

**Mark Two** - She could run as part of a group instead of on her own.



## 3 Marker

7. Max is a 16 year old college student and plays cricket. His nearest cricket team is 8 miles away. Using the information provided, describe three individual factors that may affect his accessibility to cricket training (3 marks)

**Mark One** – Location of training – Max is 16 so cannot drive, which means he will rely on public transport or parents to get to training.

**Mark Two** – Time – Max is still at college so he will have homework to complete in the evening, which will mean he might not have time to train.

**Mark Three** – Cost – Cricket membership/equipment/clothing is expensive and because Max doesn't work, he will have to rely on his parents for financial support.

## 4 Markers

8. Using sporting examples, outline what is meant by the principles of adaptation and reversibility (4 marks)

**Mark One** – Adaptation refers to changes to the body due to increased training loads.

**Mark Two** – For example if a tennis player starts to take part in weight training then they may find that their muscle size and power will increase over time.

**Mark Three** - Reversibility refers to when fitness gains from training are lost.

**Mark Four** - For example if a marathon runner stops training for two weeks due to an injury then they will find that their aerobic endurance levels will decrease and they will become fatigued at a quicker rate.

9. Identify what the letters F and I stand for in FITT principles and give an example of how each can be applied to a weekly training programme. (4 marks)

**Mark One** – Frequency

**Mark Two** – For example, the individual could plan to train 3 days in the week.

**Mark Three** - Intensity

**Mark Four** - For example, the individual could plan to work out at a moderate intensity/aim to work at 60% max HR



**Training Thresholds** are based on **Heart Rate** and are set to make sure that people train at an effective but safe level.

**Aerobic Training Threshold**

→ 60-80% of Max HR

**Anaerobic Training Threshold**

→ 80-90% of Max HR



### Aerobic Training Example

Max HR:  $220 - 25 = 195$   
Beats per Min.

Aerobic training zone =  
60-80% of Max HR

60% of 195 = 117

80% of 195 = 156

Maximum  
Heart Rate =  
 $220 - \text{Age}$



% of Max HR can be  
used to achieve  
progressive overload

Working out the  
aerobic training  
threshold of a  
25 year old  
runner

Therefore Aerobic  
Training Threshold = 117-  
156 Beats per Min

### Weight Training - Calculating Repetition Maximums

- 1 Rep Max. (RM) = the heaviest amount you can lift in one repetition.
- Should train at 80% intensity
- 15 Rep Max. (RM) = the heaviest amount you can lift and repeat 15 times.
- Should train below 70% intensity

1 RM is for strength  
15 RM is for muscular endurance



## A3 DETERMINING EXERCISE INTENSITY

1. Training Threshold (percentage max HR)
2. Borg Rating of Perceived Exertion

### The Borg Rating of Perceived Exertion Scale

Perceived exertion is how hard you feel like your body is working.

#### Rating of Perceived Exertion Borg RPE Scale

6	Very, very light	How you feel when lying in bed or sitting in a chair relaxed. Little or no effort.
7		
8		
9	Very light	Target range: how you should feel with exercise or activity
10	Fairly light	
11		
12	Somewhat hard	
13		
14		
15	Hard	How you felt with the hardest work you have ever done
16		
17	Very hard	
18	Very, extremely hard Maximum exertion	Don't work this hard!
19		
20		

Manually taking  
pulse rate



Heart Rate  
Monitors

Pulse Points

Count the number of heart  
beats for 30 seconds and  
multiply by 2.

Radial pulse - wrist  
Carotid pulse - neck



Measuring  
Exercise Intensity

Smart Watches

Apps



RPE can be used to  
estimate heart rate (HR),  
using the equation:  
 $\text{RPE} \times 10 = \text{HR}$



## 1 Markers

1. Steve is 15 years old and wants to improve his aerobic endurance. To do this, he plans three training sessions a week working at an intensity of 60-80% Max HR



a) Calculate Steve's Max HR. (1 mark)

**Mark One** -  $220 - 15 = 205\text{bpm}$

b) Calculate 80% of Steve's Max HR. (1 mark)

**Mark One** -  $220 \times 0.8 = 164\text{bpm}$

2. Jessica is has just taken part in a 45 minute dance session. Her RPE is 14. Estimate her heart rate. (1 mark)

**Mark One** -  $\text{RPE} \times 10 = \text{HR}$   
 $14 \times 10 = 140 \text{ bpm}$

## 2 Marker

3. Identify two ways to estimate heart rate. (2 marks)

**One mark for each of the following up to a maximum of two marks:**

- Heart rate monitor
- Smart watch
- Pulse
- Rate of perceived exertion/RPE calculation

4. Give two benefits of using technology to measure exercise intensity. (2 marks)

**Mark One** – Heart rate monitors and smart watches provide an instant reading which means that the individual does not have to stop training to find their pulse.

**Mark Two** – Readings from monitors and smart watches will be more accurate than taking one's own pulse.





## 3 Markers

5. Christine is a 22 year old triathlete. It is important that she trains at the correct intensity.

Describe how Catherine would work out her aerobic training zone. (3 marks)

**Mark One** – She would take 60-80% of his maximum heart rate

**Mark Two** – Maximum heart rate =  $220 - \text{age} = 198$

**Mark Three** – 60% of MHR = 119 and 80% MHR = 158  
119-158bpm



6. Describe how a runner could use three different technologies to measure the intensity of their running. (3 marks)

**Mark One** – They can use a heart rate monitor to track their heart rate/ to make sure they stay within training thresholds

**Mark Two** – They can use smart watches to monitor heart rate/ track their timing or speed

**Mark Three** – They can use running apps to measure the distance



7. Paul is 25 years old and is training for an open meet where he wants to achieve a 50m freestyle PB. Using the simplified Karvonen formula, work out Paul's anaerobic training zone. (3 marks)

**Mark One** – Max HR =  $220 - \text{Age}$  therefore Paul's max HR =  $220 - 25 = 195$

**Mark Two** – 80% of 195 = 156bpm

**Mark Three** – 90% of 195 = 175.5bpm

Vo2 max score is likely to be lower

**Aerobic training zone = 156-176bpm**



# UNIT CHECKLIST

## The Importance of Fitness for Successful Participation in Sport

### Types of sports requiring specific components of fitness

- Aerobic endurance ☐
- Muscular endurance ☐
- Muscular strength ☐
- Speed ☐
- Flexibility ☐
- Body composition ☐
- Power ☐
- Agility ☐
- Reaction time ☐
- Balance ☐
- Coordination ☐



# UNIT CHECKLIST

## Fitness Training Principles

### The Basic Principles of Training (FITT)

- Frequency ☐
- Intensity ☐
- Time ☐
- Type ☐

### Additional Principles of Training

- Progressive overload ☐
- Specificity ☐
- Individual Differences ☐
- Adaptation ☐
- Reversibility ☐
- Variation ☐
- Rest and Recovery ☐



# UNIT CHECKLIST

## Exercise Intensity and How it can be Determined



### Intensity

- Measure heart rate (HR)
- HR intensity to fitness training methods

☐  
☐

### Target zones and training thresholds

- Calculate training zones
- Apply HR max to training
- Aerobic training zone
- Anaerobic training zone

☐  
☐  
☐  
☐

### The Borg (6-20) Rating of Perceived Exertion Scale

- $RPE \times 10 = \text{Heart Rate (HR)}$

☐

### The relationship between RPE and heart rate

- $RPE \times 10 = \text{HR (bpm)}$

☐

Calculate 1RM for strength and 15RM for muscular endurance

☐

### Technology to measure exercise intensity

- Heart rate monitors
- Smart watches
- Apps

☐  
☐  
☐



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